

Application No. 10/762,563
Amendment dated October 20, 2010
Reply to Office Action of May 25, 2010

REMARKS

**Reconsideration And Allowance
Are Respectfully Requested.**

Claims 28-54 are currently pending. Claims 51-54 have been amended. Claims 1-27 have been canceled. Claims 55-57 have been added. Claims 28-50 have been withdrawn. No new matter has been added.

The non-final Office Action of May 25, 2010 and the references cited therein have now been carefully studied. Reconsideration and allowance of this application are earnestly solicited.

The undersigned wishes to thank Examiner Kingan for graciously conducting an interview on September 21, 2010. During the course of this interview, the present invention as well as proposed amendments to the claims which would define over the prior art of McBride, Karp and Seki were discussed.

The present invention is directed to a microfluidic arrangement for metering a first liquid and for separating this liquid from a second liquid. This arrangement is particularly shown in FIGS. 2-7. The arrangement includes an inlet reservoir 1 and an outlet reservoir 3 having a first channel 2 extending between the inlet reservoir 1 and the outlet reservoir 3. A set of second channels 6 branch off of the first channel 2 and includes a recess 7 provided in a first portion of each of the second channels and a capillary stop device 9 provided beyond the recess 7. A series of third channels would extend from the capillary stop device 9 and would exit the microfluidic arrangement at an outlet 13 based upon the application of negative pressure

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thereto. It is important to note that movement between the first reservoir 1, the first channel 2 as well as the series of second and third channels is accomplished due to the fact that the capillarity of the sections remains the same or increases from the branch point between the first channel and each of the second channels as far as the capillary stopping device. It is also important to note that the reservoir 1 as well as the first, second and third channels and the capillary stop device are all provided on a single planar surface.

The Examiner has rejected claim 54 under 35 U.S.C. §112 as being drawn to a subject matter not described in the specification since this claim recited that the third channels end at a capillary stop. Consequently, claim 54 has been amended to recite that the third sections are connected to a capillary stop and discharge liquid into one of a plurality of second outlets. Consequently, reconsideration and removal of this rejection are respectfully urged.

The Examiner has rejected claims 51-53 under 35 U.S.C. §103(a) as being unpatentable over the references to McBride and Karp. The Examiner has taken the position that while the reference to McBride does not teach that a main channel 48 has an inlet provided at one end and an outlet provided at a second end, that the second input 46'' of the McBride patent could operate as an output. Furthermore, the Examiner has indicated that while the McBride and Karp references do not teach the capillarity in the area of the outlet of the first or main channel, the reference to McBride does teach that force in the fluid flow may be provided by capillary

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action and therefore it would be obvious to use a capillarity at the outlet as least as great of that of the inlet. This rejection is respectfully traversed.

As previously indicated, the present invention is directed to a microfluidic arrangement using the difference in capillarity of the various channels to transport a liquid through the microfluidic arrangement. Additionally, as included in claims 51-54 as now amended, the first channel, the second channels and the third channels are all provided on the same planar surface. Furthermore, as now recited in new claims 55-57, the reservoir is also provided on the same planar surface as the first channel, the second channels and the third channel.

During the course of the aforementioned interview, the differences between the present invention as now claimed and the McBride reference were discussed. As shown in FIGS. 1 and 2, the McBride reference is provided with plates 7, 8 and 9 connected to one another by an indexing means of detents, flanges or locating pins. Specifically recited in column 4, lines 25-27 "Means for transporting or moving the samples from one of the plates to the other can be by pumping, draining, or capillary action". The above-quoted section of McBride is the only portion of this patent which discusses capillary action. Therefore, it is clear that the capillary action described in this section of the McBride patent refers only to the use of capillary action allowing fluid to flow between vertically aligned plates. More particularly, the McBride patent specifically describes use of low-pressure subsystem 20 and a high-pressure subsystem 22 coupled to a gas input 18 to transport liquids from a fluid reservoir 14 through a valve 15

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allowing fluid to flow through the system shown in FIGS. 5-7 and 10. There is absolutely no recitation that capillary action is used to transport fluid through what the Examiner characterizes as a first channel, second channels and third channels of the McBride reference. The McBride patent in column 4, line 16 specifically refers to the device as a "multi-layered sample microfluidic device 16 with detachable well plates". This is in contradistinction to the present invention as claimed which specifically utilizes the movement of liquid along a single planar surface.

Additionally, it is respectfully urged that the Examiner's characterization that the second input 46'' can act as an output as required by the claims of the present invention is misplaced. As specifically recited in column 6, lines 28-32, "referring now to FIG. 10, to overcome the decrease in pressure due to the distance from the input and the pressure drop due to each branch 50, a first input 46' and a second input 46 '' may be coupled to main channel 48 at opposite ends." Clearly, McBride characterizes 46'' as an input and, due to the decrease in pressure along a main channel due to the number of branches 50, a second input may be required. This is in contradistinction to the present invention as claimed which requires that in the area of the outlet, the capillarity of the present invention is greater than or equal to the capillarity in the area of the inlet allowing the fluid to move in the first channel from its inlet to its outlet. This clearly does not and cannot occur in the McBride reference. Clearly McBride

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understood the distinction between an input and output and is why he labeled 46' as a first input and 46'' as a second input.

Furthermore, there is no recitation in the Karp reference relating to the movement between an inlet and an outlet due to the difference in capillarity between various portions of any of the channels included in the Karp reference. Consequently, Karp does not overcome the deficiencies of McBride and it is believed that claims 52-54 as amended define over the prior art combination of the McBride and Karp references. Still further, newly added claims 55-57 recite the fact that the reservoir is directly adjacent to and in fluid communication with the first channel. Since the McBride patent provides a valve 15 between the reservoir 14 and the microfluidic arrangement therein, these claims are not anticipated or rendered obvious with respect to the combination of the McBride and Karp references. Furthermore, claim 53 has been amended to specifically recite the use of a recess 7 provided within the second channel. The Examiner's configuration of the McBride reference clearly does not include any of the features presently recited in these claims.

The Examiner has rejected claim 54 under 35 U.S.C. §103(a) as being unpatentable over the McBride in view of the Karp reference and the reference to Pelrine et al. This rejection is respectfully traversed.

Similar to the rejection of claims 51-53 in view of the McBride and Karp combination, the addition of the Pelrine reference does not render claim 54 obvious since Pelrine does not

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utilize capillary action to move the fluid in a single plane through the first channel, the second channels and the third channels as recited in claim 54 as well as recited directly or indirectly in the additional claims of this application. Therefore, reconsideration and withdrawal of this rejection are respectfully urged.

Finally, although not cited in the Office Action of May 25, 2010, the previously cited reference to Seki was discussed during the aforementioned interview. Although the Seki reference does utilize the capillary phenomenon to move liquid between various flow channels, this reference does not include the configuration as claimed in the present invention utilizing the first channel, a plurality of second channels and a plurality of third channels. Therefore, it is believed that it would not be obvious to construct the claimed microfluidic arrangement of the present invention utilizing the Seki reference.

It is believed that the present invention as now claimed is not rendered obvious through any combination of the McBride, Karp, Pelrine and Seki references. Reconsideration and allowance of this application are earnestly solicited.

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If additional information is required, or if the Office has any questions that might expedite prosecution of the above-referenced application, the Office is urged to contact the undersigned at (703) 920-1122.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "M. Wasson", with a stylized flourish at the end.

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